

AMENDMENTSIn the Claims

Please replace pending claims 1-35, 38-40, 52, and 53 with those set forth below, in which claims 1, 11, 19, 20, 25, 32, 38, and 52 are amended and claim 27 is canceled.

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1. (Currently Amended) A memory device comprising:  
a plurality of dynamically refreshable memory cells; and  
one or more dynamically changeable use registers corresponding  
respectively to groups of one or more memory cells, wherein the use registers are  
configurable to indicate whether the corresponding groups of memory cells are in  
use and wherein the use registers are implemented adjacent to the memory cells;

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wherein the memory device is configured to omit refreshing of memory  
cells that are not in use.

2. (Original) A memory device as recited in claim 1, further comprising  
self-refresh logic on the memory device, wherein the self-refresh logic is  
configured to not refresh the indicated unused memory cells.

3. (Original) A memory device as recited in claim 1, further comprising  
recent-access flags associated with respective sets of the memory cells, the recent-  
access flags being configured to indicate whether the associated sets of memory  
cells were accessed in a manner that refreshed the memory cells during a previous  
refresh cycle interval, wherein the memory device is configured to omit refreshing  
of those memory cells that are indicated by the recent-access flags to have been

accessed in a manner that refreshed the memory cells during a previous refresh cycle interval.

4. (Original) A system comprising a plurality of memory devices as recited in claim 1, further comprising a memory controller configured to set the use registers to indicate whether the memory cells are unused.

5. (Original) A system comprising a plurality of memory devices as recited in claim 1, further comprising a memory controller configured to periodically refresh only those memory cells that are indicated by the use registers to be in use.

6. (Original) A system comprising a plurality of memory devices as recited in claim 1, further comprising a memory controller configured to cache at least some of those memory cells that are indicated by the use registers to be in use and to omit refreshing of the cached memory cells.

7. (Original) A memory device as recited in claim 1, wherein the use registers comprise bits that each correspond to a set of memory cells.

8. (Original) A memory device as recited in claim 1, wherein the use registers comprise bits that each correspond to a row of memory cells.

9. (Original) A memory device as recited in claim 1, wherein the use registers comprise bits that each correspond to a bank of memory cells.

10. (Original) A memory device as recited in claim 1, wherein the use registers comprise bits that each correspond to a page of memory cells.

11. (Currently Amended) A memory device comprising:  
a plurality of memory cells; and  
one or more dynamically changeable use registers corresponding respectively to groups of one or more memory cells, wherein the use registers are programmable to indicate whether the corresponding groups of memory cells are in use and wherein the use registers are implemented adjacent to the memory cells.

12. (Original) A memory device as recited in claim 11, further comprising self-refresh logic on the memory device, wherein the self-refresh logic is configured not to refresh unused memory cells.

13. (Original) A memory device as recited in claim 11, further comprising recent-access flags associated with respective sets of the memory cells, the recent-access flags being configured to indicate whether the associated sets of memory cells were accessed in a manner that refreshed the memory cells during a previous refresh cycle interval, wherein the memory device is configured to omit refreshing of those memory cells that are indicated by the recent-access flags to have been

accessed in a manner that refreshed the memory cells during a previous refresh cycle interval.

14. (Original) A system comprising a plurality of memory devices as recited in claim 11, further comprising a memory controller configured to program the use registers depending on whether the memory cells are being used.

15. (Original) A system comprising a plurality of memory devices as recited in claim 11, further comprising a memory controller that is configured to refresh only those memory cells indicated by the use registers to be in use.

16. (Original) A system comprising a plurality of memory devices as recited in claim 11, further comprising a memory controller that is configured to operate unused memory cells at reduced power.

17. (Original) A system comprising a plurality of memory devices as recited in claim 11, further comprising a memory controller configured to cache at least some of those memory cells whose use registers indicate they are not unused and to omit refreshing of the cached memory cells.

18. (Original) A memory device as recited in claim 11, wherein the use registers comprise bits that each correspond to a row of memory cells.

19. (Currently Amended) A system comprising:

one or more memory devices having dynamically refreshable memory cells;  
a memory controller configured to periodically refresh the memory cells of  
the memory devices;

one or more dynamically changeable use registers corresponding  
respectively to groups of one or more memory cells, wherein the use registers are  
configurable to indicate whether the corresponding groups of memory cells are in  
use;

refresh logic on one of the memory devices configured not to refresh  
memory cells that are not in use; and

recent-access flags associated with the memory cells, the recent-access  
flags being configurable to indicate whether corresponding memory cells were  
accessed in a manner that refreshed the memory cells during a previous refresh  
cycle interval, wherein the memory controller is configured not to refresh those  
memory cells that are indicated to have been accessed in a manner that refreshed  
the memory cells during the previous refresh cycle interval.

20. (Currently Amended) A system as recited in claim 19, wherein the use  
registers are implemented adjacent to the memory cells ~~the memory controller is  
configured not to refresh those memory cells that are indicated to have been  
accessed in a manner that refreshed the memory cells during the previous refresh  
cycle interval.~~

21. (Original) A system as recited in claim 19, wherein the memory  
controller is configured to cache at least some of those memory cells that are not

indicated by the one or more use registers to be unused and to omit refreshing of the cached memory cells.

22. (Original) A system as recited in claim 19, wherein the use registers are on the memory controller.

23. (Original) A system as recited in claim 19, wherein the use registers are on the memory devices.

24. (Original) A system as recited in claim 19, wherein the use registers comprise bits that each correspond to a row of memory cells.

25. (Currently Amended) A system comprising:  
memory including one or more memory cells;  
a memory controller;  
an operating system configured to dynamically allocate and de-allocate the memory and to identify allocated and de-allocated memory to the memory controller; and

recent-access flags associated with the memory and implemented adjacent to the memory cells, the recent-access flags being configurable to indicate whether corresponding memory cells were accessed in a manner that refreshed the memory cells during a previous refresh cycle interval, wherein the memory controller is configured not to refresh those memory cells that are indicated to have been

accessed in a manner that refreshed the memory cells during the previous refresh cycle interval;

wherein the memory controller is responsive to the operating system to operate non-allocated memory at reduced power.

26. (Original) A system as recited in claim 25, wherein the memory is dynamically refreshable memory and the memory controller operates the non-allocated memory at reduced power by omitting refreshing of non-allocated memory.

27. (Canceled)

28. (Original) A system as recited in claim 25, wherein memory controller is configured to cache at least some of the allocated memory and to omit refreshing of the cached memory.

29. (Original) A system as recited in claim 25, further comprising a plurality of use bits corresponding respectively to memory rows, wherein each use bit being configurable to indicate whether its corresponding memory row is currently allocated, and wherein the memory controller is configured to omit refreshing of memory rows that are not currently allocated.

30. (Original) A system as recited in claim 25, further comprising a plurality of use bits on the memory controller corresponding respectively to

memory rows, wherein each use bit is configurable to indicate whether its corresponding memory row is currently allocated, and wherein the memory controller is configured to omit refreshing of memory rows that are not currently allocated.

31. (Original) A system as recited in claim 25, wherein the memory comprises a plurality of discrete memory devices, the system further comprising a plurality of use bits on the memory devices corresponding respectively to memory rows, wherein each use bit is configurable to indicate whether its corresponding memory row is currently allocated, and wherein the memory controller configured to omit refreshing of memory rows that are not currently allocated.

32. (Currently Amended) In a system having dynamically refreshable memory rows, a method of memory power management, comprising:  
keeping track of which memory rows are in use and therefore need refreshing;  
periodically refreshing those memory rows that are in use;  
omitting refreshing of memory rows that are not in use; and  
determining which rows have been accessed in a manner that refreshed the memory [[cells]] rows during a previous refresh cycle interval, wherein the determining act is performed by utilizing a plurality of recent-access flags associated with each of the memory rows and implemented adjacent to the memory rows.



33. (Previously Presented) A method as recited in claim 32, further comprising:

omitting refreshing of memory rows that have been accessed in a manner that refreshed the memory cells during the previous refresh cycle.

34. (Original) A method as recited in claim 32, further comprising:  
caching at least some of the memory rows that are in use; and  
omitting refreshing of the cached memory rows.

35. (Original) A method as recited in claim 32, wherein keeping track comprises maintaining a plurality of flags corresponding respectively to the memory rows.

36-37. (Canceled)

38. (Currently Amended) A memory controller configured to perform actions comprising:  
periodically refreshing memory cells;  
receiving notifications regarding which memory cells are in use;  
omitting refreshing of those memory cells that are not in use; and  
keeping track of which memory cells have been accessed in a manner that refreshed the memory cells during a previous refresh cycle interval;  
wherein the keeping track action is performed by utilizing a plurality of recent-access flags that are implemented adjacent to the memory cells.

39. (Previously Presented) A memory controller as recited in claim 38, the controller being configured to perform further actions comprising:

omitting refreshing of those memory cells that have been accessed in a manner that refreshed the memory cells during the previous refresh cycle.

40. (Original) A memory controller as recited in claim 38, the controller being configured to perform further actions comprising:

caching at least some of the memory cells that are in use; and  
omitting refreshing of the cached memory cells.

41-51. (Canceled)

52. (Original) A method comprising:

periodically refreshing memory cells;

keeping track of which memory cells have been accessed in a manner that refreshed the memory cells during a previous refresh cycle interval; and

omitting refreshing of those memory cells that have been accessed in a manner that refreshed the memory cells during the previous refresh cycle,

wherein the keeping track act is performed by utilizing a plurality of recent-access flags that are implemented adjacent to the memory cells.

53. (Original) A memory controller as recited in claim 52, further comprising:

receiving notifications regarding which memory cells are in use; and  
omitting refreshing of those memory cells that are not in use.

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